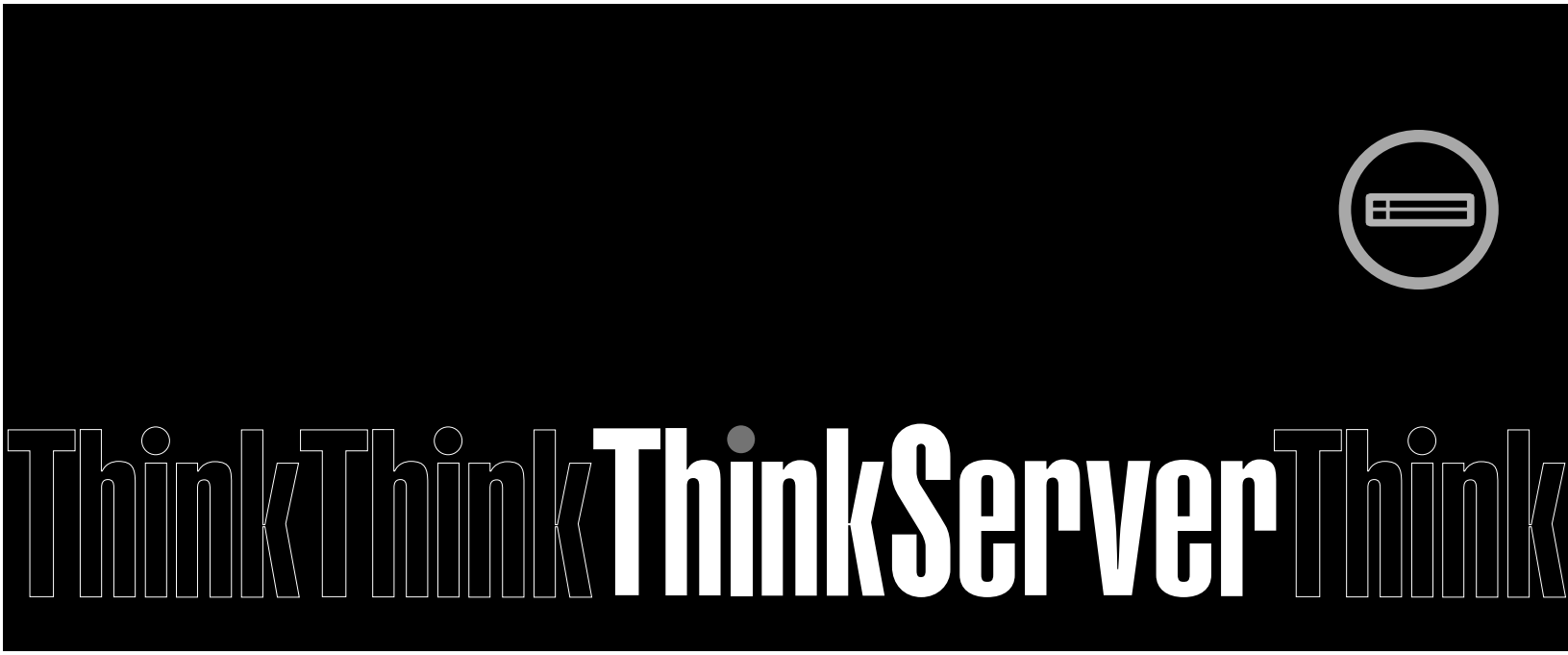
lenovo

ThinkServer Management Module User Guide



ThinkServer RD330, RD430, RD530, and RD630

Note:

Before using the information and the product it supports, ensure that you read and understand the following:

- “Safety information” on page 1
- Appendix B “Notices” on page 31

First Edition (August 2012)

Contents

Chapter 1. Introduction 1
Terminology 1
Safety information 1

Chapter 2. Overview of the Lenovo ThinkServer Management Module . . 3
Features of the ThinkServer Remote Management Module 3

Chapter 3. Configuration of the ThinkServer Remote Management Module 5

Chapter 4. ThinkServer Remote Management Module Quick Start . . 7
Prestart 7
Log-on 10
Navigation 11
Log-out 12

Chapter 5. Remote console (KVM) operation 13
Start the redirection console 13
Main window of the remote console 13
Menu bar of the remote console 13
View menu of the remote console 13
Macros menu of the remote console 14
Tools menu of the remote console 14
Power menu of the remote console 14

Chapter 6. ThinkServer Remote Management Module Web console options 15
Properties 15
Viewing properties 15
Server information 16
Viewing sensor readings 16
Viewing the System Event Log 16
Event management 17
Platform Events 17
Trap Settings (SNMP) 18
Email Settings (SMTP) 18
Serial Over LAN 18
Remote control 19
Remote management 19
Virtual media 20
Power control 21
Configuration 22
Network 22
Network security 23
Security 23
Users 23
Service 24
IPMI 24
Session. 25
LDAP 26
Update 26
Utilities 27
Languages 28

Appendix A. Frequently asked questions 29

Appendix B. Notices. 31
Trademarks 32

Chapter 1. Introduction

Thank you for ordering and using the Lenovo® ThinkServer® Management Module (TMM), hereinafter referred to as Remote Management Module.

The *User Guide* describes how to use the Remote Management Module, the overview of the module features, and how to set up and operate the module.

The *User Guide* is for system administrators responsible for installation, troubleshooting, upgrade and maintenance of the Remote Management Module. As a system administrator, once you are familiar with the *User Guide*, you can use Remote Management Module to access remotely from any location to respond for emergency.

Terminology

The following table lists the terms used in this document and its corresponding descriptions.

Abbreviation	Definition
BMC	System board Management Controller
DHCP	Dynamic Host Configuration Protocol
IPMI	Intelligent Platform Management Interface
KVM	Keyboard, Video, and Mouse
MAC	Media Access Controller
TCP/IP	Transfer Control Protocol/Internet Protocol

Safety information

WARNING

With reference to either the Guide or other documents, you should always pay particular attention to safety information before operating the ThinkServer. To ensure full compliance with the existing certification and licensing, you must follow the installation instructions in the Guide.

Power on / off: the power button can not cut off system power or Remote Management Module power. To cut off the power of Remote Management Module, you must disconnect the ac power cord from the power outlet. When opening the chassis to install or remove the parts, you should make sure the ac power cord has been disconnected.

Dangerous situations, equipment and cables: power, telephones, and signal cables may have the danger of electric shock. Before opening the device, shut down the server, disconnected the power cord, the communication system, network and modem connected to the server. Otherwise, it may result in personal injury or equipment damage.

Electrostatic Discharge (ESD) and ESD protection: Electrostatic Discharge (ESD) can damage disk drivers, system board and other components. We recommend that you complete all the steps in this Section only in the ESD protective workstations. If ESD workstation is unavailable, please wear anti-static wrist strap while holding parts and connect the wrist strap to the ground wire (that is, any unpainted metal surface) of the server chassis to provide ESD protection.

ESD and holding system boards: be careful when holding the system board. They are extremely sensitive to ESD. Only touch the edge when holding the system board. Lay the system board with components side facing upwards after taking the system board out of the protection bag or the sever. Use the conductive foam pad (if any) rather than the system board package. Do not slide the system board on any surface.

Installing or removing jumper: jumper is a small plastic conductor between two jumper pins. Some jumpers have a small wing on the top for you to use fingertips or fine needle forceps to clip it. If the jumper has no such wing, be careful when installing or removing it with needle forceps, and clip the jumper's narrow face instead of the wide one. Clipping the wide face will damage the contacts inside the jumper, which will lead to intermittent faults to some functions controlled by the jumper. Clip the jumper carefully with pliers or other tools and do not squeeze when removing it. Otherwise, pins on the system board may be bent or broken.

Chapter 2. Overview of the Lenovo ThinkServer Management Module

This topic describes the features of the Remote Management Module.

The Remote Management Module runs on the server system as an integrated solution and integrates the embedded operating system. Independent of the server operating system, the embedded operating system can provide a whole set of complete, stable and effective solution for the server. As a system administrator, you can respond anytime and anywhere to emergency failure and take remote control on the server through the network.

Features of the ThinkServer Remote Management Module

The ThinkServer Remote Management Module is easily accessible by remote KVM and controllable via LAN or Internet. It will digitize and compress the collected video signal, keyboard, mouse signals and then send to the remote console. Embedded with remote access and related control software, the module also allows integrated remote power management via IPMI. Key features of the Remote Management Module are as follows:

- Embedded Web UI - Remote power on / off, system health, system information, alert notification and event log.
- USB 2.0 media redirection - boot from remote media
- Security - open source SSL
- Compatible with IPMI V2.0
- KVM - allow remote viewing and configuring in the POST and BIOS setup utility

Chapter 3. Configuration of the ThinkServer Remote Management Module

This topic describes how to use the server configuration utility to change the Remote Management Module from the un-configured status to the running status. When first installed, the Remote Management Module by default will search DHCP server on the network to automatically assign IP address, subnet mask and gateway. It is recommended that users manually set a fixed IP address in the BIOS.

To set an IP address, do the following:

1. Press F1 as soon as you see the logo screen.
2. From the BIOS setup menu, select **Server Management → BMC Network Configuration → Configuration Address Source**.
3. From the Configuration option, you can choose **STATIC** or **DHCP** to set IP address.
4. When you finish the configuration, save the settings.

Table 1. IPMI 2.0 Configuration submenu

Configuration Address Source	**STATIC**	Static IP configuration. IP and the subnet mask can be set manually.
	DHCP	Dynamic IP configuration. The system can obtain IP automatically.

Chapter 4. ThinkServer Remote Management Module Quick Start

This topic describes how to quickly acquaint with related operations of the Remote Management Module. In addition, it also describes the advanced features of how to log on the module and options available while browsing, and how to log out.

Prestart

The Remote Management Module has an embedded Web server and an application with multiple standard interfaces. This topic describes these interfaces and their usages. You can use the TCP/IP protocol to access these interfaces.

Note: As the supported functions of the product vary with configurations, refer to the actual product description.

For more information about the initial settings, see Chapter 3 “Configuration of the ThinkServer Remote Management Module” on page 5 . The user name in this topic is “lenovo”. Besides “lenovo”, other user names and passwords are also accepted. The default user name and password are as follows:

- Username = lenovo
- Password = lenovo

The Remote Management Module is accessible through the standard Java-enabled Web browser with HTTP and HTTPS.

HTTP / HTTPS: The embedded Web server provides full access permission. You can access the Remote Management Module via encrypted HTTPS protocol or HTTP protocol. When accessing through the HTTP protocol, note the following:

1. With access to ThinkServer Remote Management Module via the HTTPS protocol, the browser may prompt you to trust and install the security digital certification, and you just follow the prompts to import and confirm the certification.
2. In the Internet Explorer® 6 Web browser on the Microsoft® Windows Server® 2003 operating system, if using HTTPS protocol to access the Remote Management Module, you need to check **Internet Explorer Enhanced Security Configuration** item in the **Control Panel → Add / Remove Windows Components**.
3. In IE7 on the Microsoft® Windows Server® 2008 operating system, if using HTTPS protocol to access the Remote Management Module, you need to do the following amendments to the **Configure IE ESC** item of the security information of the server manager, as shown in the following figures:

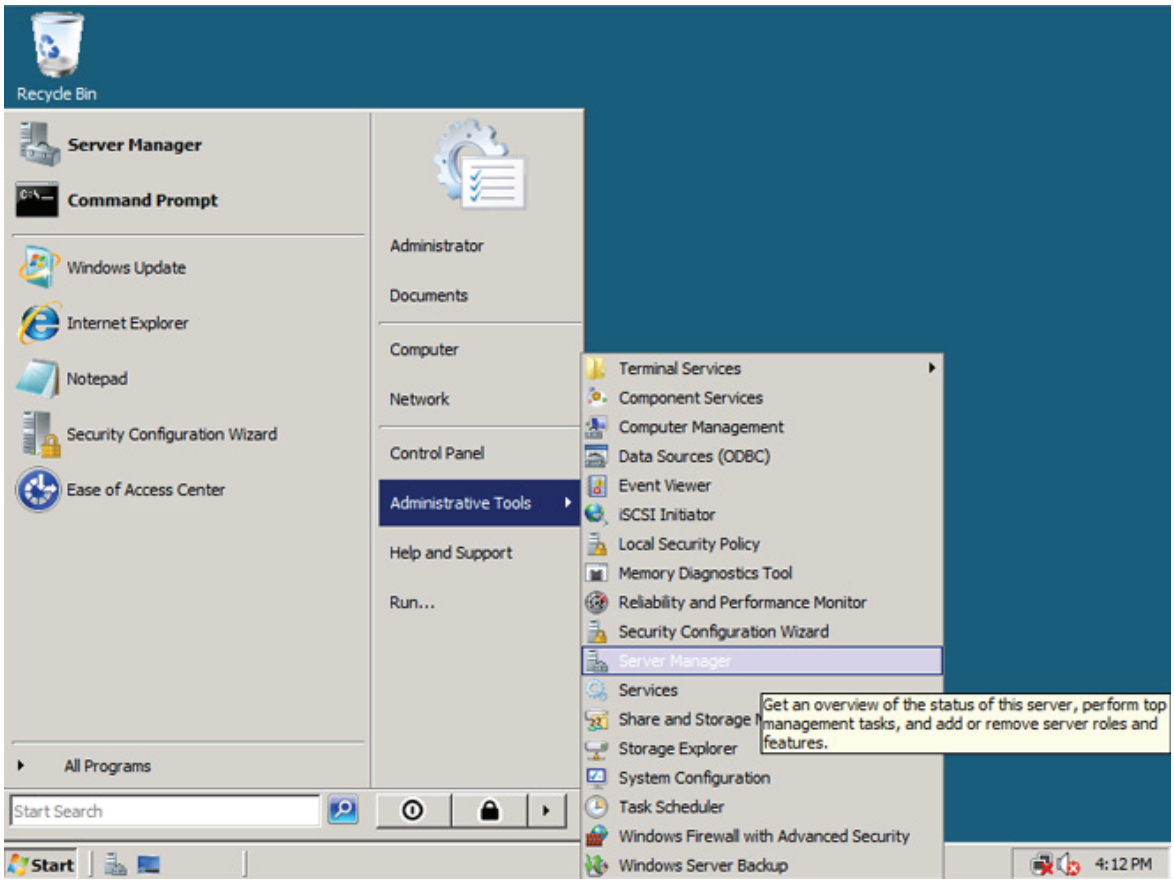


Figure 1. Configuring IE ESC - setp 1

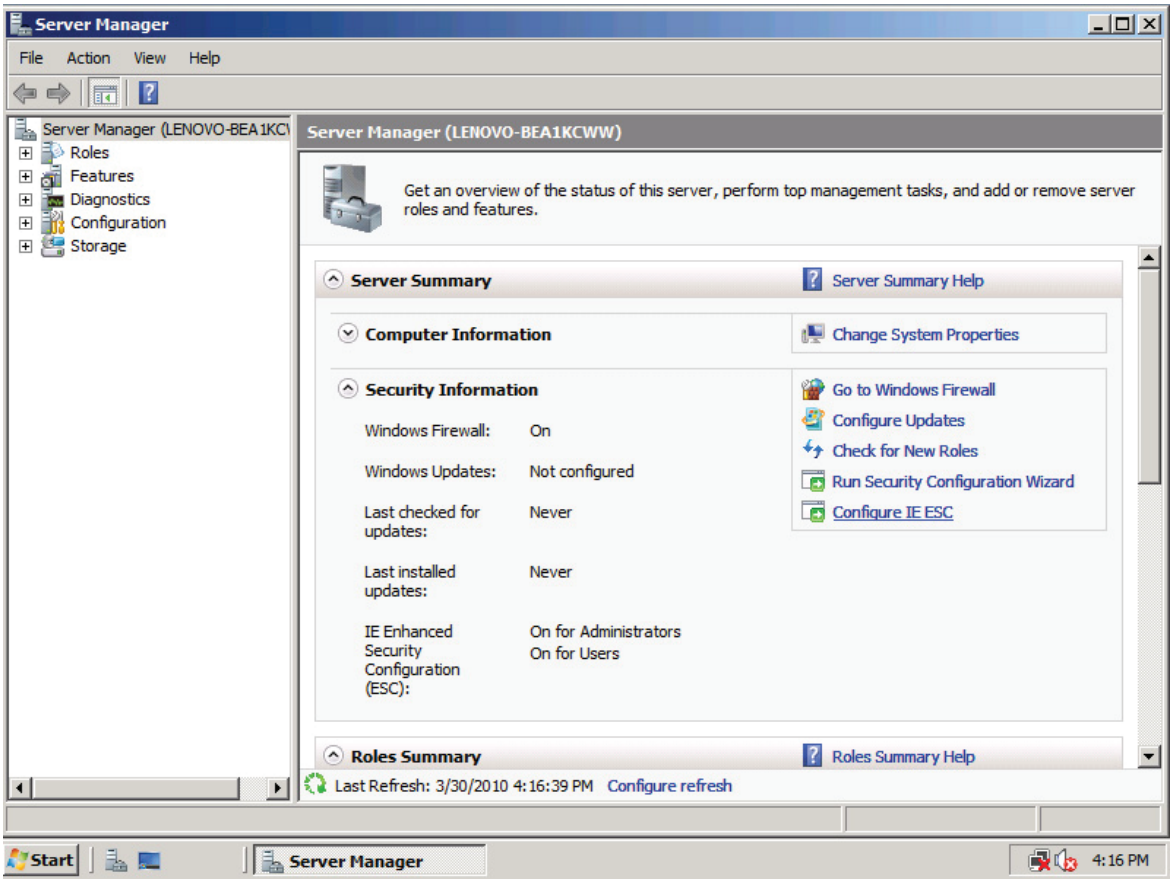


Figure 2. Configuring IE ESC - setp 2

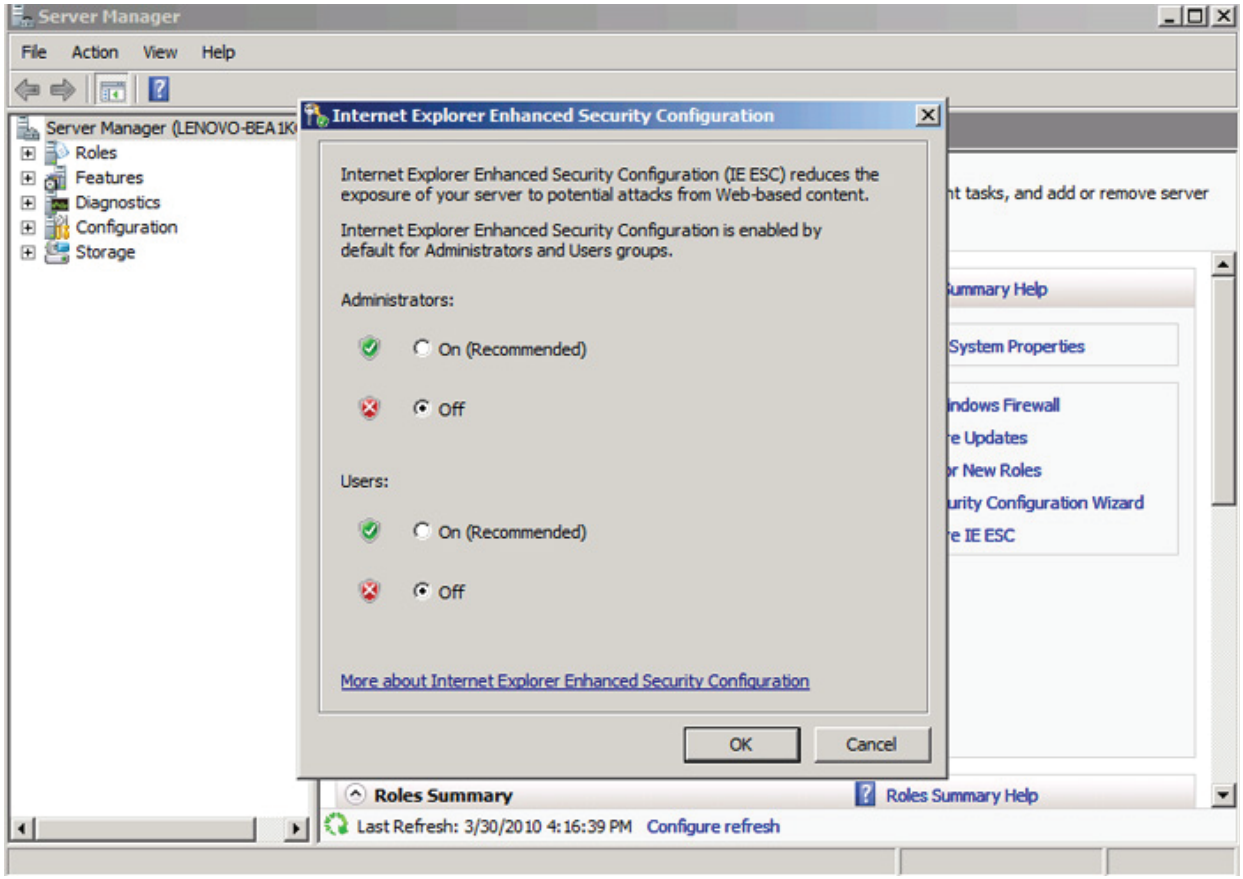


Figure 3. Configuring IE ESC - setp 3

For making the remote console (KVM) window of the managed server works, you must install Java runtime environment (JRE) V6.0 Update 24 or later.

Log-on

To log on to the ThinkServer Remote Management Module, do the following:

1. Enter the IP address assigned by the ThinkServer Remote Management Module into the Web browser. For example:
   http://10.223.131.36/

   For secure connection, refer to the following example:
   https://10.223.131.36/

   The Web browser will then be directed to the logon page of the Remote Management Module.
2. On the logon page of the Remote Management Module, enter the user name and password. For example:
   - Username = lenovo
   - Password = lenovo
3. Click **OK** to view the home page of the Remote Management Module.

After a successful initial logon, the system administrator can create new users and has full permission of Remote Management Module.

Navigation

When the ThinkServer Remote Management Module is successfully logged on, the ThinkServer Remote Management Module home page is displayed.

There are several tabs on the vertical toolbar which is on the left pane of the ThinkServer Remote Management Module home page. By clicking these tabs, you can get the specific system information and take the relevant tasks listed in the following table:

Table 2. Tabs on the ThinkServer Remote Management Module home page

Tab	Comments
Properties	System information is shown on the **Properties** page.
Configuration	This tab contains the following submenus: • **Network** • **Network Security** • **Security** • **Users** • **Services** • **IPMI** • **Sessions** • **LDAP** • **Update** • **Utilities**
Server Information	This tab contains the following submenus: • **Power** • **Thermal**
System Event Log	Click this tab to view the system event log (SEL).
Event Management	This tab contains the following submenus: • **Platform Events** • **Trap Settings** • **Email Settings** • **Serial Over LAN**

There also are tabs on the top of the home page:

Table 3. Tabs on the top of the ThinkServer Remote Management Module home page

Tab	Comments
Support	View the contact information about the company of this product.
Help	View the brief description about the current page on the right pane of the browser. By clicking the “X” on the top right of the pane, you can close the Help window.
About	View the version of the software.
Logout	Terminate the current Web Console session. **Note:** If the remote console (KVM) window is active, it will close automatically when you are logging out. After logout, the Web console will back to logon screen.

There is a **Refresh** button on the right pane. Click this button to refresh the current page.

Log-out

To log out the ThinkServer Remote Management Module and turn back to the log on page, click **Logout** on the right top of the program home page.

Note: Automatic Timeout: If the Web console detects no user activity within fifteen minutes, the current session will be automatically terminated. If the user has opened the KVM remote console window, then the Web session will not automatically timeout. When the automatic timeout happens, the system will inform the user to log on again if the user wants to access the Web console to take operations.

Chapter 5. Remote console (KVM) operation

The remote console is the redirection screen, keyboard, and mouse of the remote host system with a ThinkServer Remote Management Module installed. If there is a need to use the remote console of the managed host system, ensure that the server has Java* runtime environment plug-in.

When the remote console is startup, a new window will be opened, showing the screen of the host system. Operating the remote console is just like an administrator is sitting in front of the screen of the remote system. This means that the user can use the keyboard and mouse as he or she usually does.

Start the redirection console

The remote console is the redirection keyboard, video, and mouse of the remote host system with a ThinkServer Remote Management Module installed.

To start the redirection window for remote console KVM, log on to the home page of the ThinkServer Remote Management Module. On the left pane of the home page, under **Serial Over LAN → vKVM & vMedia**, click **Launch**, the **Virtual KVM and Media Launch** window is displayed on the right pane of the home page. Then, click **Launch Java KVM Client** in the **Virtual KVM and Media Launch** window to start the redirection console and carry out remote management for server.

After clicking **Launch Java KVM Client**, you will be prompted to run and download Java network boot protocol Jviewer.jnlp document.

Notes:

- Before the JNLP document is booted, Java Runtime Environment (JRE) V6.0 Update 24 or a later version must be set up on the client.
- The client browser must allow the pop-up windows from the IP address of the ThinkServer Remote Management Module.

Main window of the remote console

When you start the remote console, the main window of the remote console is displayed.

The remote console main window shows the screen of the remote server. Operating the remote console is just like you are in front of the remote server. The response speed maybe a little delay, depending on the bandwidth and the delay between the ThinkServer Remote Management Module and the remote console.

Menu bar of the remote console

There is a menu bar on the top of the remote console main window. You can view the status of the remote console and configure the setup for local remote console through the items on the menu bar.

View menu of the remote console

By clicking the **View** option on the menu bar of the remote console, you can take the following operations:

- **Hide Status Bar**: Hide the KVM status at the bottom of the screen.
- **Refresh**: Refresh the screen.
- **Full Screen**: Switch between the window mode and full screen of the remote console.

- **Fit**: Fit the window mode.

Macros menu of the remote console

By clicking the **Macros** option on the menu bar of the remote console, you can take the following operations:

- **Hold Ctrl/Alt/Windows keys**: Allow simulating to press these special keys on the remote keyboard. On the local keyboard, these special keys will be carried out through local operating system, rather than transfer to the remote operation system.
- **Alt+Ctrl+Del**: Issue Alt+Ctrl+Del command to the remote operation system.

Tools menu of the remote console

By clicking the **Tools** option on the menu bar of the remote console, you can take the following operations:

- **Session options**: Set the mouse mode and the video quality.
- **Session user list**: View the current users.
- **Single Cursor**: Set cursor in different states.
- **States**: View the current state of the remote redirection.

Power menu of the remote console

By clicking the **Power** option on the menu bar of the remote console, you can control the power action.

Chapter 6. ThinkServer Remote Management Module Web console options

This topic describes every page of the Web console and each page is divided into several parts corresponding separately to the several tabs at the left side of the pane. In each part, there are detailed illustrations and introductions for each menu option in the left of the pane.

Notes:

- The first menu item of each tab is the default page which will automatically appear when selecting the corresponding tab.
- Click the **Help** button on the right horizontal toolbar, and the Web console will show the relevant information about each page.

Properties

By default, the home page of the ThinkServer Remote Management Module shows the **Properties** page, including general information about the server. For more details, read the information in this topic.

Viewing properties

The Platform Information page shows the summary of the general information.

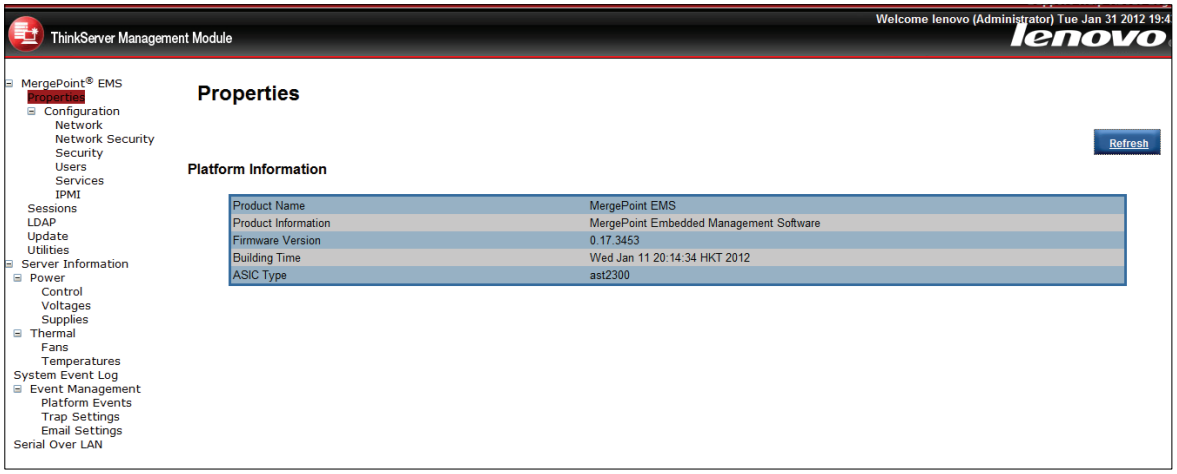


Figure 4. Firmware information

The above page provides the following server information:

Table 4. Platform information page

Product Name	Customizable product name.
Product Information	Customizable product description.
Firmware Version	Firmware version information.
Building Time	Date and time of building the BMC firmware
ASIC Type	The platform of the server.

Server information

The Server Information page shows the data related to the server health, such as sensor readings and event logs. Click the **Server Information** tab on the left pane to show this page.

Viewing sensor readings

The **Temperatures** and **Voltages** pages show the system sensor information, including readings and status.

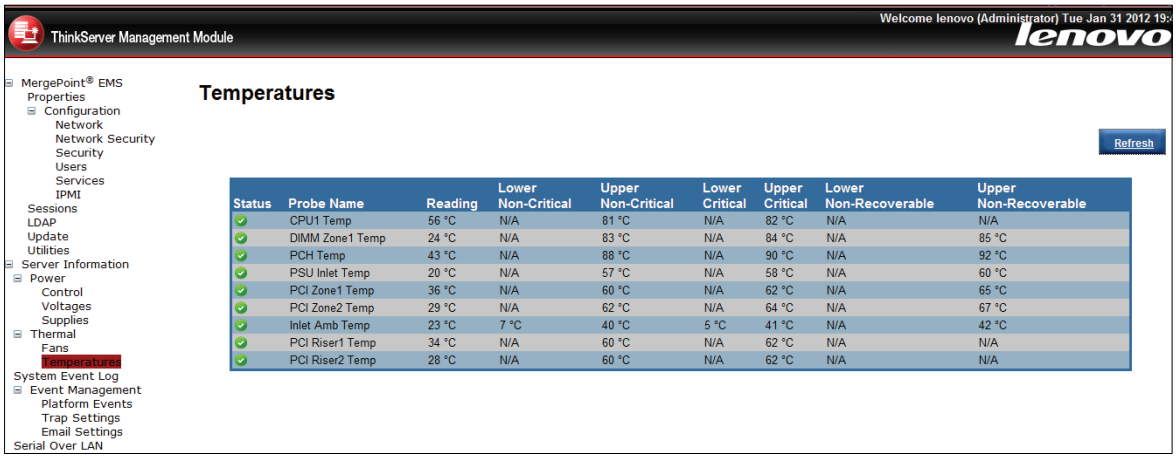


Figure 5. Sensor readings on the Temperatures page

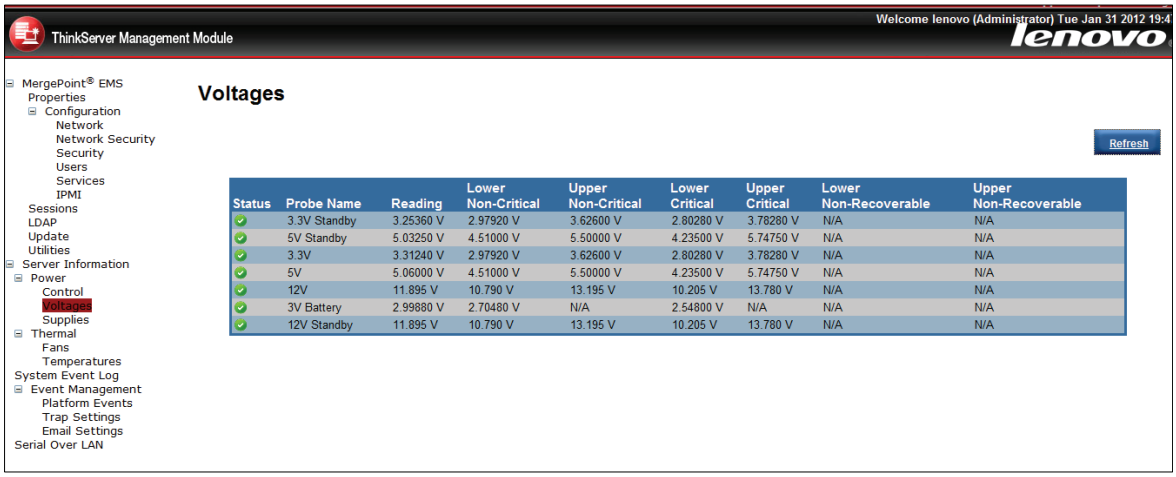


Figure 6. Sensor readings on the Voltages page

Viewing the System Event Log

The **System Event Log** page shows the event logs.

- To clear the log buffer, click **Clear Log**.
- To update the log list, click **Refresh**.

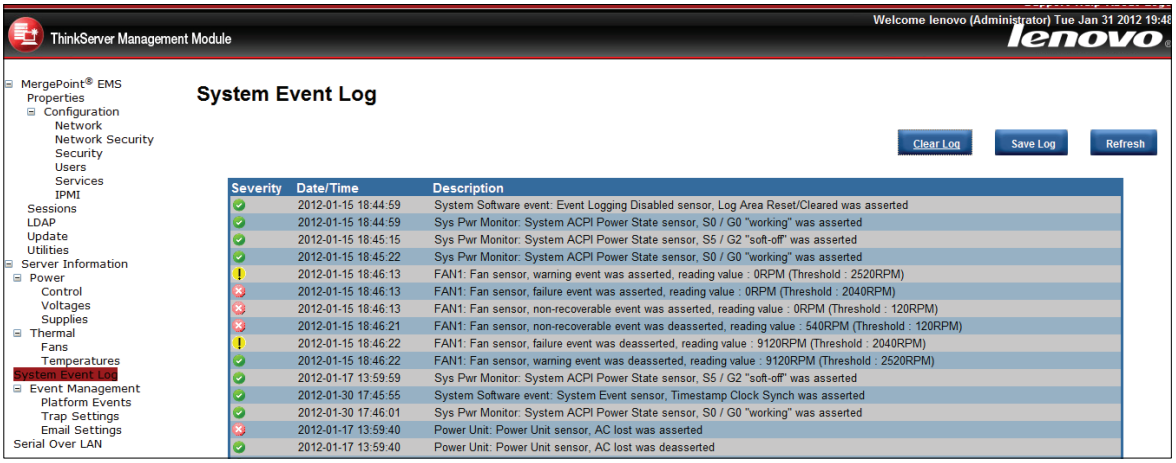


Figure 7. System Event Log

Event management

The **Event Management** tab is used to configure alerts. The following server management options are included:

- **Platform Events**
- **Trap Settings**
- **Email Settings**
- **Serial Over LAN**

Platform Events

You can use this function to modify or delete the alert settings, or send a test alert to the destination.

The alerts page lists all the alerts action, including reboot, power cycle, power off, and generate PEF. If you need to modify the alert settings, you can select an alert action and click the **Apply Changes** button to configure it.

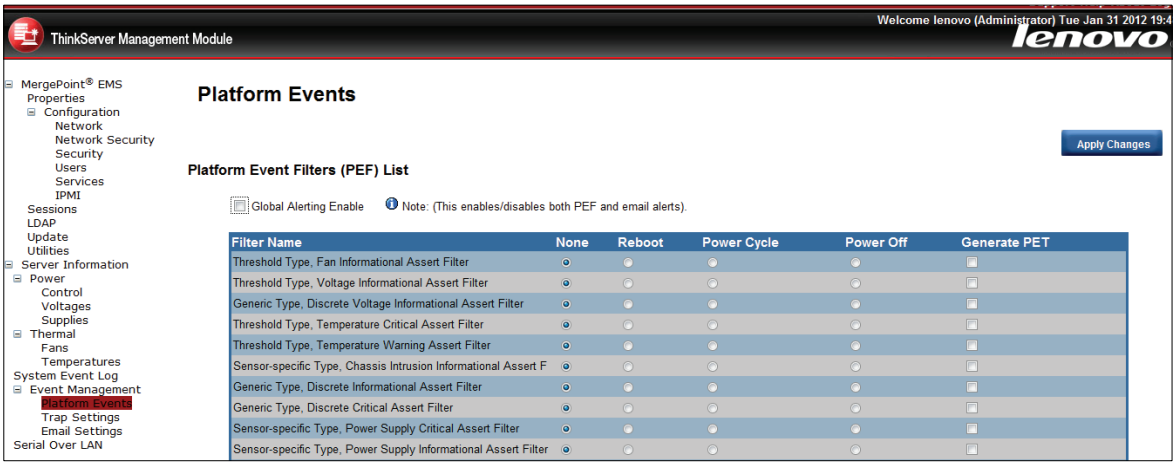


Figure 8. Alert list

Trap Settings (SNMP)

Click **Trap Settings** on the left pane of the home page to set the destination IP address.

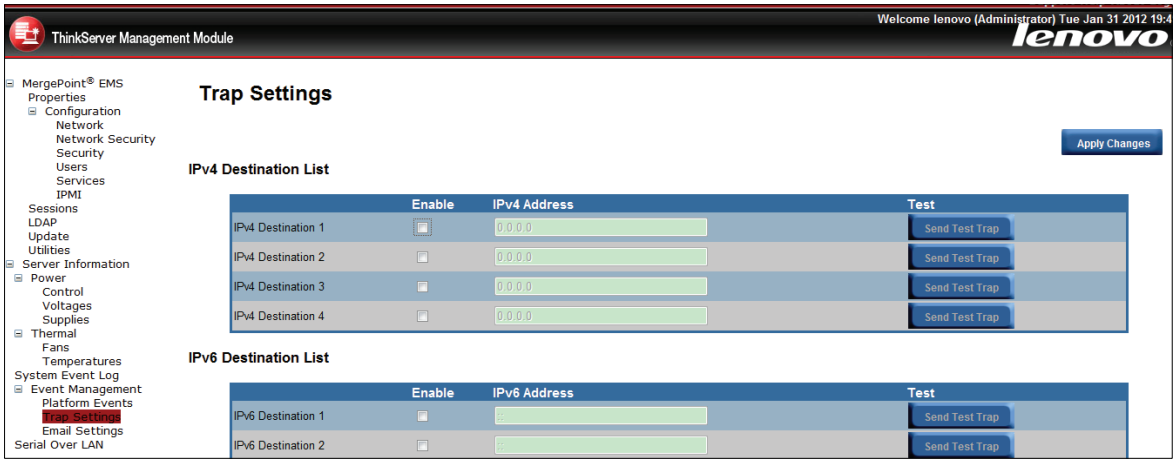


Figure 9. Trap Settings

Email Settings (SMTP)

The **Email Settings** page is used to configure the alert. Users can receive an alert by E-mail when events occur.

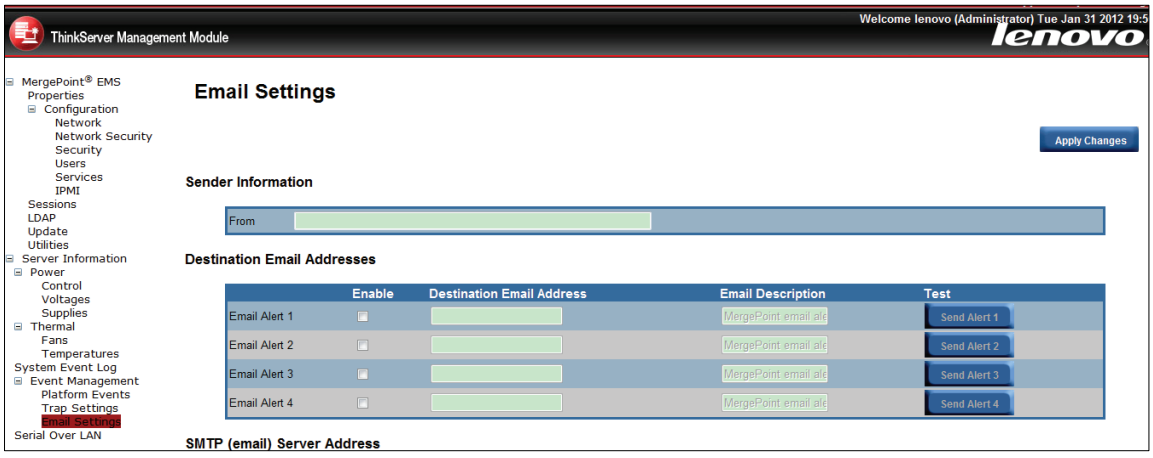


Figure 10. Email Settings

Serial Over LAN

The **Serial Over LAN** page provides the following settings:

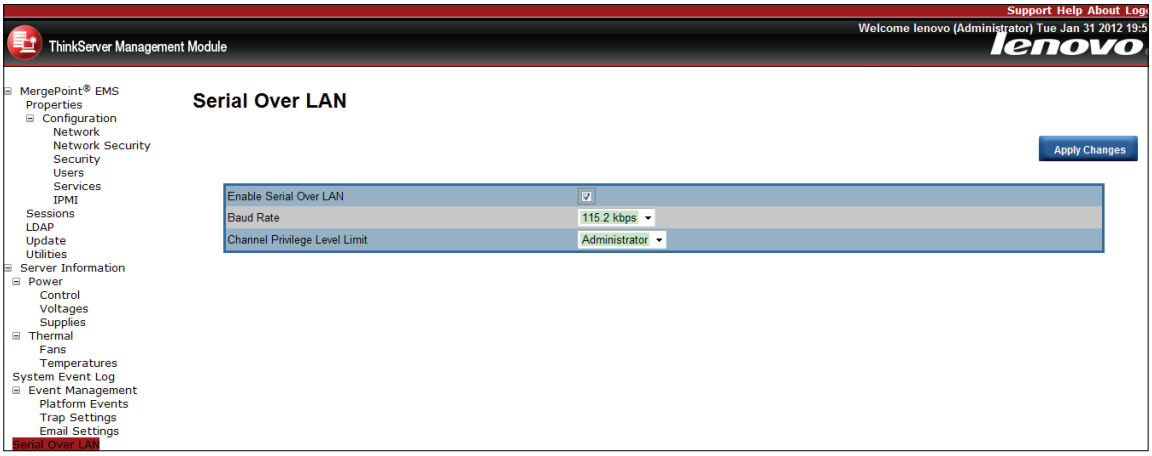


Figure 11. Serial Over LAN

Table 5. Serial Over LAN settings

Option	Comments
Enable Serial Over LAN	Enables the Serial Over LAN function when the checkbox is checked.
Baud Rate	Sets the Serial Over LAN baud rate from a drop-down list (19.2kbps, 38.4 kbps, 57.6 kbps, or 115.2 kbps).
Channel Privilege Level Limit	Sets the channel privilege level from a drop-down list (Administrator, Operator, or User).

Remote control

The **Remote Console** page enables you to execute the following remote operations on the server:

- Remote management
- Server power control

Remote management

The **Remote Management Module** page will automatically select the **Remote Console** option by default. You can open the remote console KVM redirection window from this page.

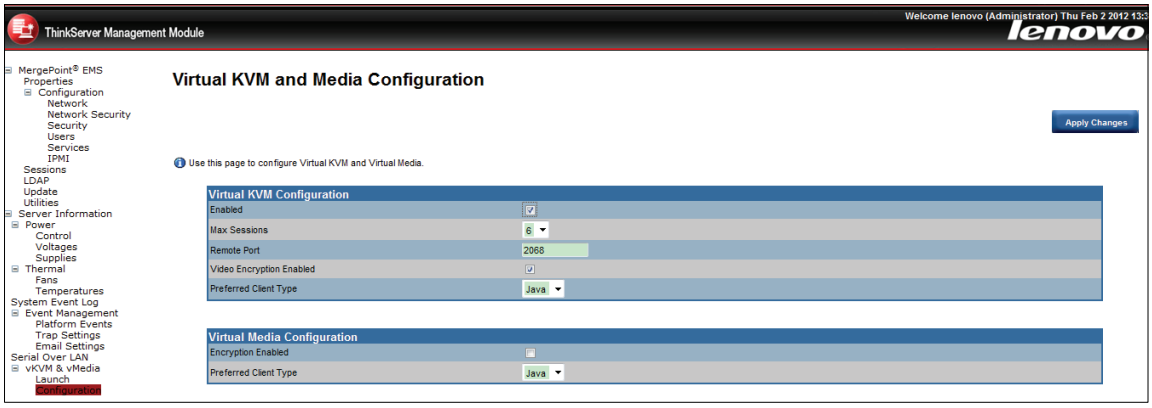


Figure 12. Remote management configuration

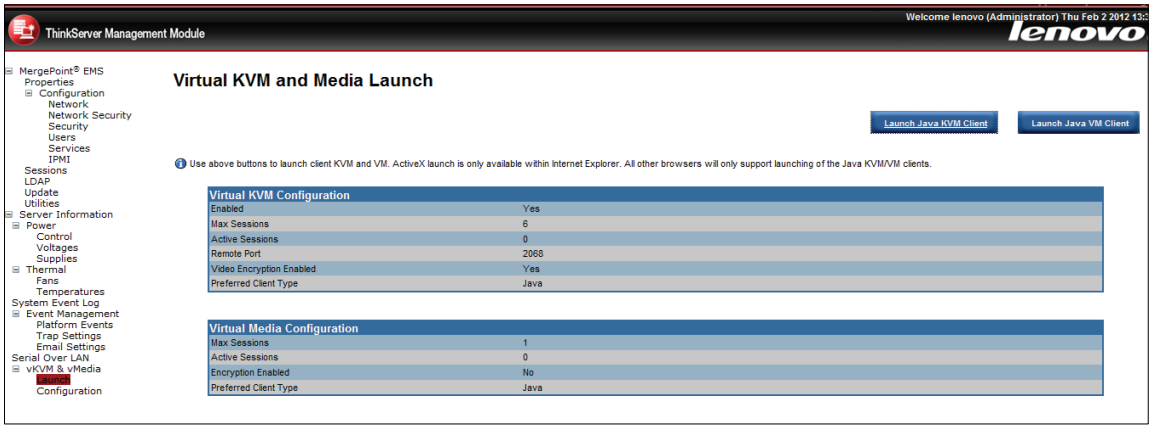


Figure 13. Remote management launch

Click the **Launch Java KVM Client** button to start the redirection console and remotely manage the server.

Note: Before you start the JNLP file, the client must be installed with Java Runtime Environment (JRE) V6.0 Update 24 or later.

Virtual media

Click the **Launch Java VM Client** button to allow the local device redirection. This feature allows starting or stopping the remote media redirection.

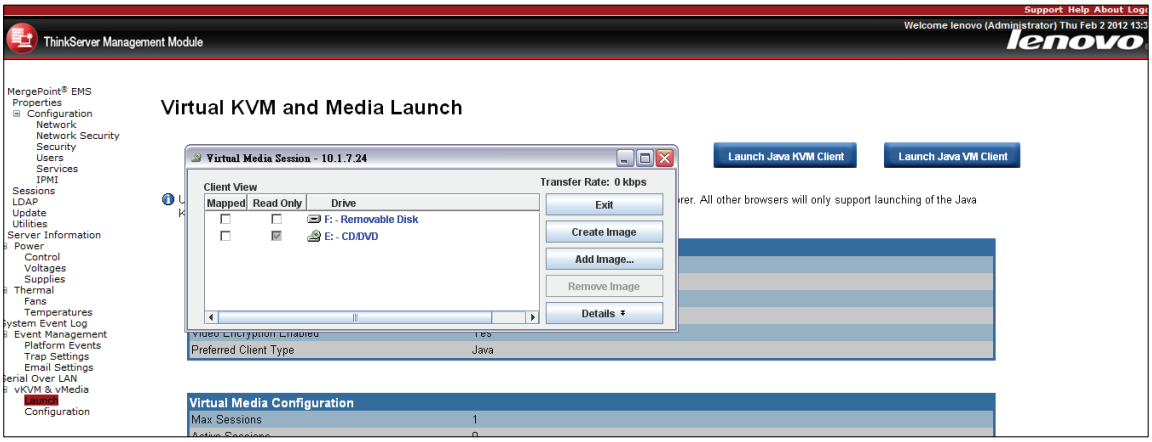


Figure 14. Redirecting virtual device

- **Redirect CDROM / Redirect ISO**: Enables you to redirect the local CD-ROM/DVD drivers or ISO images in the file system of local client to virtual CD-ROM devices in the remote systems.
- **Redirect Floppy/USB Key/Redirect Floppy/USB Key Image**: Enables you to redirect the local floppy device, local USB key device, or the IMG files for floppy disk to the virtual floppy devices in the remote system.

These virtual devices can read, write (providing the property is not read only), and boot, which are similar with any other CD-ROMs or floppies in the remote system. But only when certain media redirections are active, these virtual devices are available in the remote operating system or BIOS setting menu. The setting is valid after remote system reset or it is power-on or power-off. These devices will not disappear from the remote system until the relevant check boxes in the remote console window are cleared.

Power control

The **Power Control** page shows the server power status.

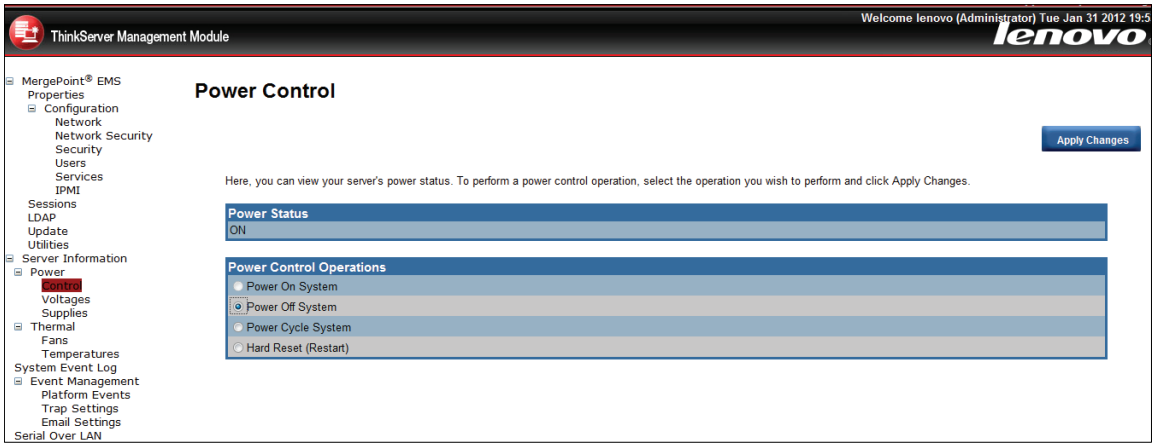


Figure 15. Power control

You can perform the following power control operations:

Table 6. Power control

Option	Comments
Power Status	Shows the current status of the power control (OFF or ON).
Power On System	Turns on the system when it is in the off state.
Power Off System	Turns off the system when it is in the on state.
Power Cycle System	Turns off, then reboots the system (cold boot).
Hard Reset (Restart)	Restarts the system without turning it off (warm boot).

Configuration

The **Configuration** page is used to configure Network settings, user settings, updates, and so on.

Network

The **Network** page is used to configure the Network settings. It includes the following options:

- **Automatic (Obtain an IP address automatically)**: Automatically obtain an IP address (use DHCP).
- **Manual (Use the following IP addresses)**: Manually configure IP addresses.

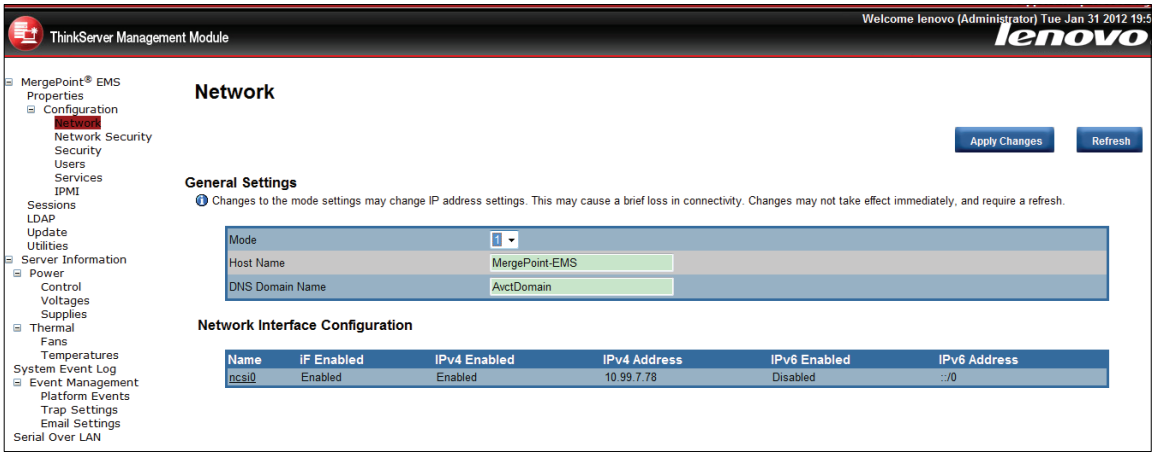


Figure 16. Network settings

You can configure the Network settings by click **ncsi0** item.

Table 7. Network settings

Option	Comments
MAC Address	The MAC address of the device (Read Only).
IPv4 Settings	If you want to configure the IP by IPv4 protocol, enable the IPv4 and then set the IP address.
IPv6 Settings	If you want to configure the IP by IPv6 protocol, enable the IPv6 and then set the IP address.
VLAN Settings	When you enable virtual LAN, you have to set the VLAN ID and Priority.

Network security

The new values are available to the firewall immediately, but may not be utilized until the next security event occurs.

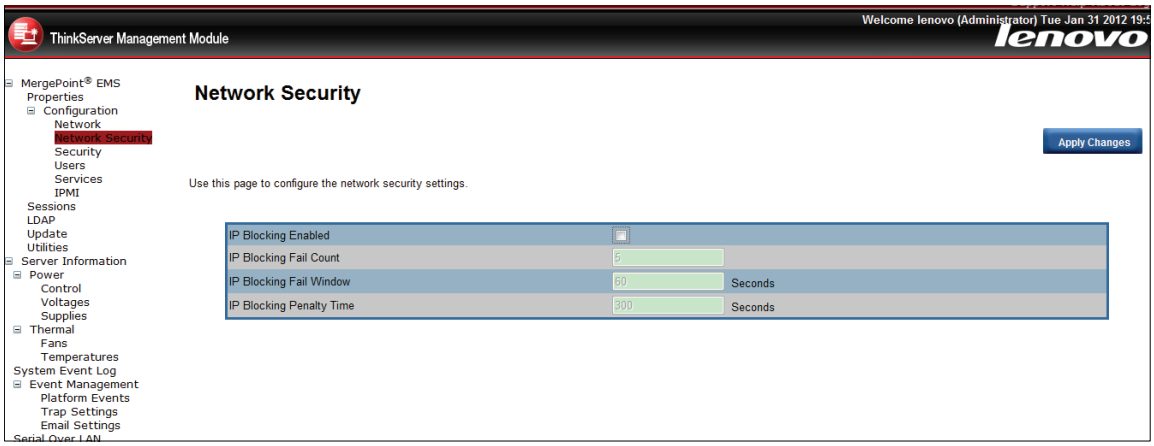


Figure 17. Network security settings

Security

This page can be used to upload SSL certificate and private key in order to get access to the device in safe mode.

- To generate an SSL Certificate, click **Generate Certificate**.
- To upload an SSL Certificate, click **Upload Certificate**.

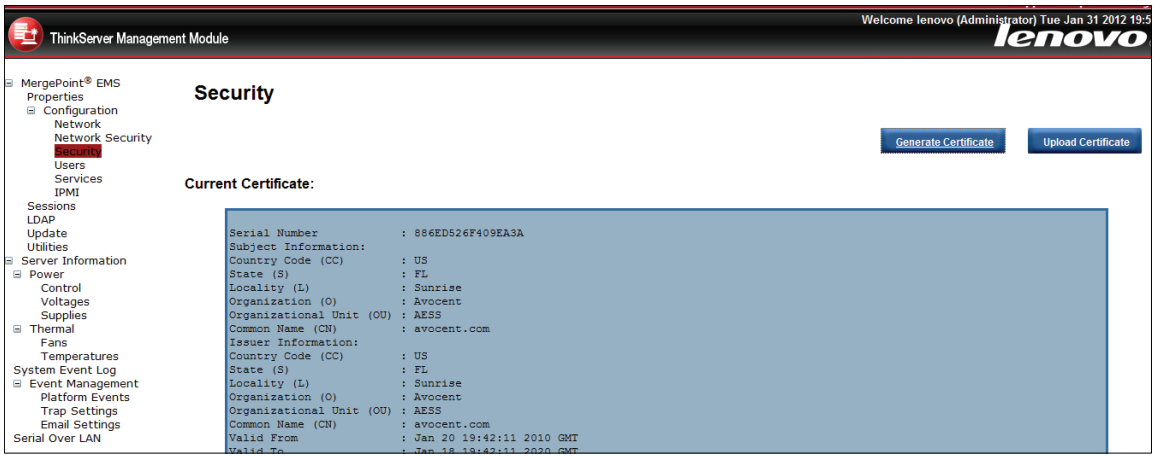


Figure 18. Security settings

Users

The **Users** page lists all users including configured users, with network permission.

The options included in this page are used to configure the IPMI users for servers and their permissions. To add a new user, you can select a blank row and click the User ID. If you would like to modify or delete a user, select the User ID in the list and click **Apply Changes** or **Delete**.

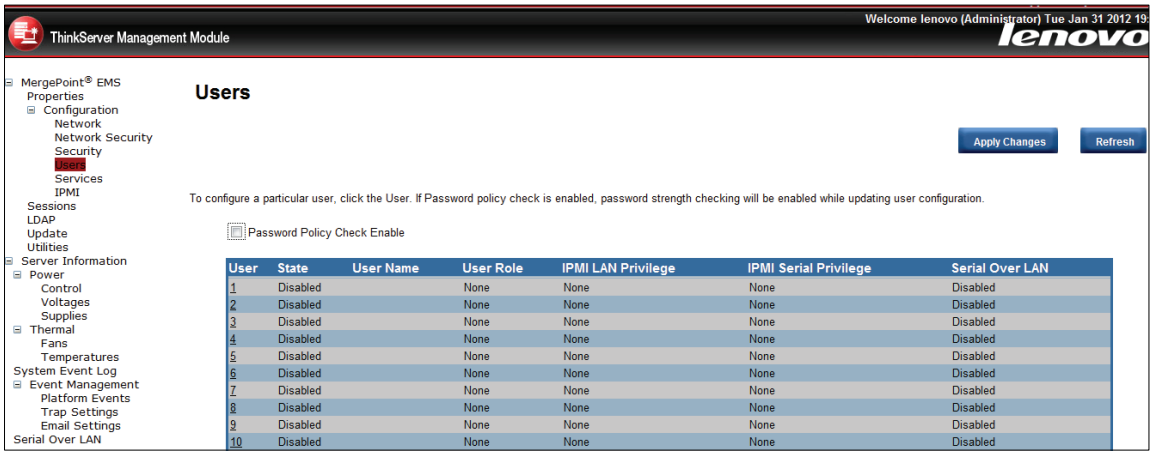


Figure 19. Users setting

Notes:

- The user lenovo and three can not be modified or deleted.
- To add a new user, select a blank row from the list and click User ID.
- To modify a user, select this user ID from the list and modify user to the relevant settings, then click **Apply Changes**.
- To delete a user, select this user ID from the list and click **Delete User**.

Service

You can configure the web server parameters (such as HTTP Port Number, HTTPS Port Number, and Timeout) on a remote computer. By default, the timeout is 1800 seconds; 5 for the Max Sessions.

When you finish the configuration, click **Apply Changes**.

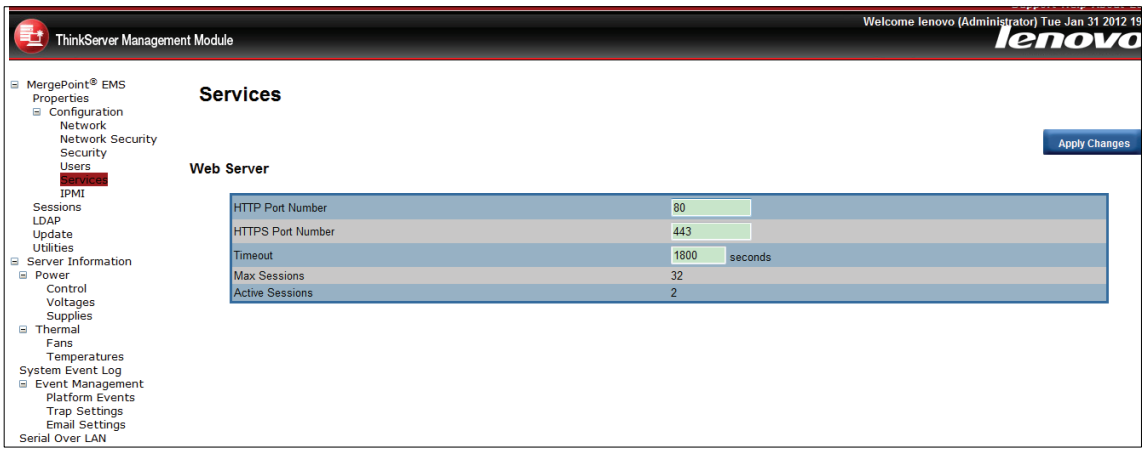


Figure 20. Service setting

IPMI

This screen contains **IPMI Serial** and **IPMI Settings**.

The **IPMI Serial** contains the following options:

Table 8. IPMI Serial

Option	Comments
Connection Mode Settings	Sets the IPMI serial connection mode from a drop-down list. Available values are **Direct Connect Basic Mode** and **Direct Connect Terminal Mode**.
Baud Rate	Sets the IPMI serial baud rate (data speed) from a drop-down list. Available values are **9600 bps**, **19.2 kbps**, **38.4 kbps**, **57.6 kbps**, and **115.2 kbps**.
Flow Control	Sets the Flow control value from a drop-down list. Available values are **None** and **RTS/CTS Flow Control**.
Channel Privilege Level Limit	Sets the channel privilege level from a drop-down list. Available levels are **Administrator**, **Operator**, and **User**.

The **IPMI Settings** provides remote configuration over LAN. To activate IPMI remote configuration by LAN, check the **Enable IPMI Over LAN** option, define the **Channel Privilege Level Limit**, and enter the **Encryption Key**. When you finish the configuration, click **Apply Changes**.

Table 9. IPMI Settings

Option	Comments
Enable IPMI Over LAN	Enables the IPMI Over LAN when the checkbox is checked.
Channel Privilege Level Limit	Sets the maximum privilege level that can be accepted on the LAN channel. Available levels are **Administrator**, **Operator**, and **User**.
Encryption Key	Sets the encryption key. This field allows from 0 to 20 two-digit Hex characters and no spaces.

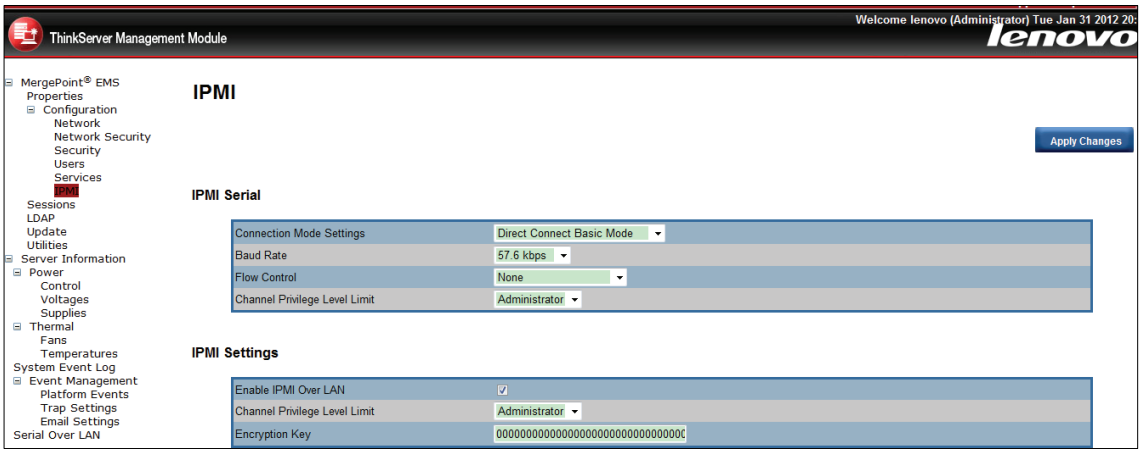


Figure 21. IPMI Serial and IPMI Settings

Session

This page displays the information about Active Sessions. Additionally, the trash icon provides the delete function for privileged users. Click **Refresh** to refresh the sessions status.

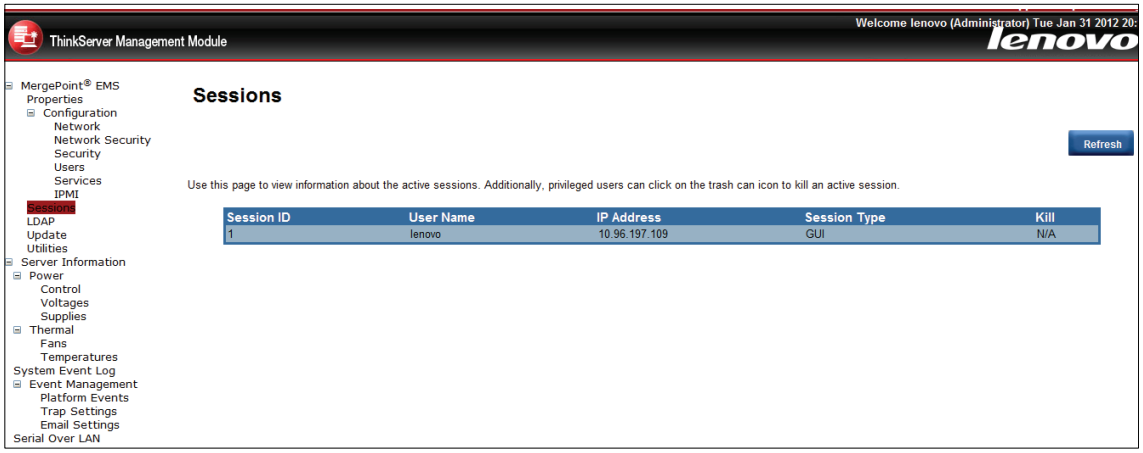


Figure 22. Session settings

LDAP

The Lightweight Directory Access Protocol (LDAP) is an application protocol for reading and editing directories over an IP network. A directory is an organized set of records. LDAP directories often use Domain Name System (DNS) names for the highest levels.

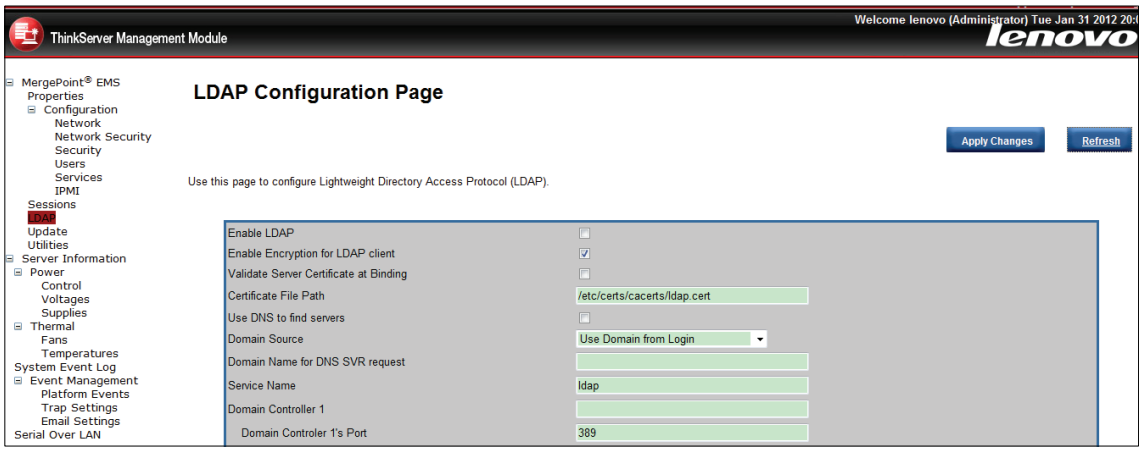


Figure 23. LDAP settings

Update

Select an image and click upload. The upload process will terminate all other sessions including vKVM.

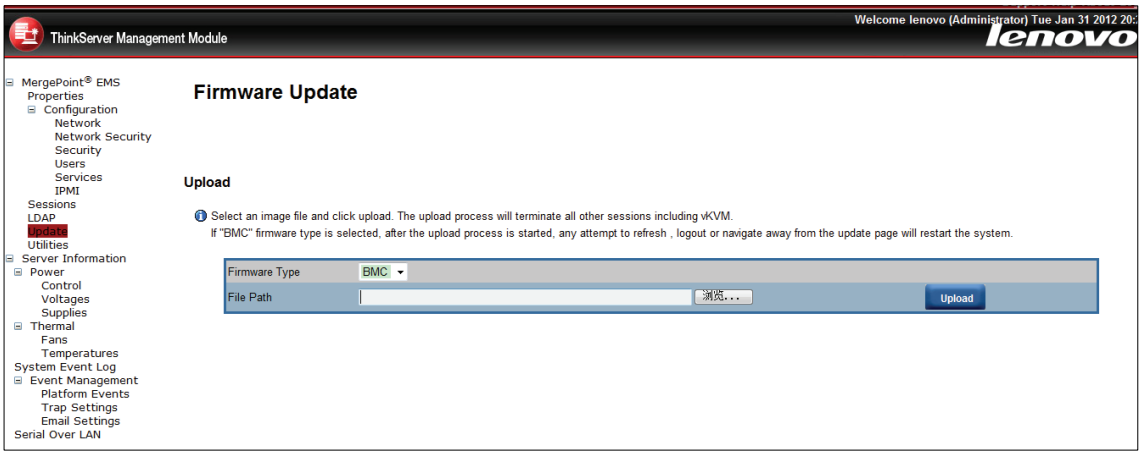


Figure 24. Firmware update

Firmware update steps:

1. Browse to or enter the path where the firmware image file resides.
2. Select update type.
3. Click the **Upload** button. If the file is a valid file, all other sessions will be terminated and the image upload will begin.
4. For a successful upload, the current firmware version and the version of the new file will be displayed, as well as the **Preserve Configuration** checkbox, **Update** button, and **Cancel** button.
5. Click the **Update** button to begin the firmware update process and view the update status. When the update is completed, the embedded software will reboot automatically. If you click the **Cancel** button, the process will be terminated and the embedded software will reboot.
6. Wait for a minute after the firmware is updated, reopen the browser logon page, enter the user name and password to log on again.

Utilities

Utilities provide BMC reboot and factory default restore functions.

- To reboot the remote management server, click **Reboot**.
- To reset the setting values to the factory default values, click **Factory Default**.

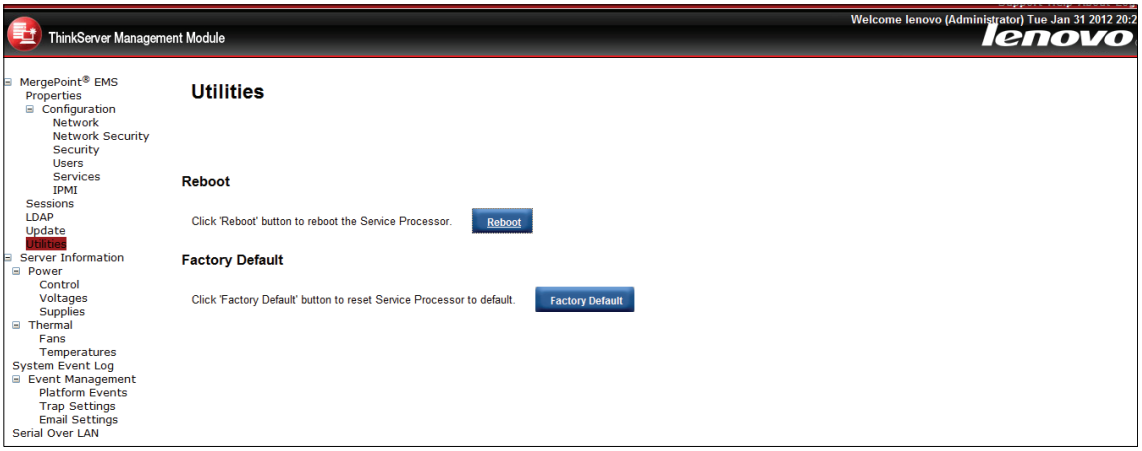


Figure 25. Utilities

Languages

The Web UI's display will according to the browser's language to decide which language to use in Web UI. The languages currently offered are Chinese and English.

Appendix A. Frequently asked questions

This topic lists the frequently asked questions.

- **Question**: Log on Remote Management Module failed.

  Answer: Check your user name and password.
- **Question**: Remote Management Module can not be connected.

  Answer: Check the hardware

  – Whether the host on which the Remote Management Module residents is correctly connected to a power supply or not.

  – Check your network configuration (IP address, router, and so on).

Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
1009 Think Place - Building One
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Trademarks

Lenovo, the Lenovo logo, and ThinkServer are trademarks of Lenovo in the United States, other countries, or both.

Internet Explorer, Microsoft, Windows, and Windows Server are trademarks of the Microsoft group of companies.

Other company, product, or service names may be trademarks or service marks of others.